Impact of Perennial Weeds on the Monaro Grazing Industries

SUMMARY PAGE

A pasture improvement program aimed at reducing the area of infested land is the most effective long term method to manage weed infestations, both economically and environmentally.

It is the loss of production from reduced stocking rate that has the greatest negative impact on business performance, rather than the cost of spraying the weeds.

Economics used are based on two scenarios, being long term (2012-2016) and current higher (2017) gross margins, with actual pasture sowing costs and livestock costs contributed from Monaro farm businesses.

A major factor in determining the costs and impacts to the farm business is the amount of arable versus non arable land.

The profitability of weed infested country that is sown down in year one, substantially exceeds that of weed free native country by year ten, despite the need for three yearly boom spraying on the sown country.

If regulation is enacted that restricts ability to sow pastures, then this would place a strong downward pressure on the profitability of livestock grazing on the Monaro, as well as limiting ability to control weed infestations.

The likely increasing rate of herbicide resistance, coupled with a predicted shift towards more summer rainfall, places the Monaro under even stronger weed pressure.

Work to identify new alternative chemical control measures would give producers options for the future.

This document deals with the two major perennial grass weeds on the Monaro, being African lovegrass (Eragrostis curvula) and Serrated tussock (Nassella trichotoma). The focus will be on the financial impact on the grazing industries from the spread of these weeds onto grazing country. Both species are hardy plants that have spread across large areas of south eastern Australia. It is the view of local producers that lovegrass has continued to spread across the Monaro even though control measures have and are being implemented.

Both species are highly invasive and can rapidly form a monoculture due to their low palatability to livestock, resulting in a large amount dead material which then smothers other species. Because of the low digestibility of the dead material there is a very slow rate of breakdown by microbial action.

A problem for the Monaro is that the existing native pastures are made up of tall growing species which allow the weed species to establish themselves as an understorey to a significant density before becoming obvious to landholders.

Native pasture infested with serrated tussock, property located in Bombala district

Control methods

Numerous factsheets have been written on control methods and links to this material are at the end of this document. A common thread among this material is the need to have a strong pasture and the maintenance of high pasture ground cover. Seedling vigour is a weak point of both weed species, so robust pastures (dense and with good growth potential) will compete against the weed seedlings.

Interaction between livestock and the weeds

Grazing plays an important role in slowing the spread of the lovegrass. In the early 2000's grazing was removed from parts of the Murrumbidgee corridor and this resulted in a monoculture within 2 years, whereas grazing and spot spraying had for the previous 10 years resulted in a slow spread. Lovegrass when in its growing phase provides enough energy and protein to result in growth of grazing animals. As seed heads are produced, the digestibility drops along with energy and protein, so that the plant is only meeting the maintenance requirements of the stock. Once the plant has senesced and been frosted, then all animals will be losing weight when grazing on this material.

The value of lovegrass to a livestock breeding enterprise depends on the timing of the reproductive cycle of the livestock. If birth and lactation occur in the green growing phase of the plant then a breeding enterprise will be successful with the addition of some other management strategies (crops, and/or supplements during winter). If the livestock reproductive cycle occurs during the period of only dead plant material livestock performance will be very poor. In this situation producers tend to run wether operations. Lovegrass will never have the plant quality to run a finishing enterprise.

Serrated tussock has even less value to the grazing animal and they will not survive grazing on tussock alone. The tussock does not smother other plants as much as lovegrass, so animals can survive on the plants between the tussocks, but this results in reduced grazing area and hence stocking rates.

Current practices

Current management can be classified into three key groups;

- **Management** of residual dry matter– fire, slashing or feeding supplements. The purpose is to remove dead material to allow other species to grow, and allow the lovegrass plant to produce higher quality green feed during its growing phase. The aim is to improve livestock performance.
- **Spraying** –either boom or spot spraying. Given available herbicides will also kill many non-target species, boom spraying is often accompanied by sowing new pasture, and may include a crop phase to lower the seed burden. Given many improved perennial grasses are tolerant of flupropanate, these new pastures are then tolerant of follow up spraying.
- **Fertilising pastures** – this sits between the first 2 methods. Improving pasture vigour decreases bare ground for weed seeds to germinate, increases competition to the weed seedling, resulting in seedling death. Fertiliser will also improve the growth and quality of the other pasture species, which will result in more grazing pressure on the weeds species when infestations are light.

Herbicide resistance

A major emerging issue is the resistance of serrated tussock on the Monaro to the primary control chemical, flupropanate. The relationship is as expected, with longer history of use of flupropanate being associated with a greater percentage of resistance in the population.

At this stage the level of flupropanate resistance in the lovegrass population is unknown.

The reduced effectiveness of this chemical against the weed species will decrease the success of control methods and increase the costs of programs due to the need for more time spent checking previously sprayed areas, and the respraying of surviving plants with another chemical.

If this extra work is not done on all infested lands, regardless of ownership, then the resistant plants will increase as a percentage of the population very quickly.

Conservation areas

High conservation value areas of the Monaro grassland will be best protected from weed invasion by being surrounded by clean vigorous

pasture. This clean buffer is the only long-term protection, as these high value sites tend to have bare ground suitable for seedling establishment of any species, and lack the ability to outcompete the weed species.

Spread of the weeds

Lovegrass has spread along rivers (it is now below the dam wall of Burrinjuck), and by sand taken from the rivers and used in road construction. In the Yass region there are lovegrass sites which started from sand used in work related to roads, bridges and culverts. These sites can then start a new spread pattern. The problem related to construction has also occurred on the Monaro. This human vector creates an additional problem as it can quickly create new infection sources in clean areas. With serrated tussock, the spread of seeds by wind is more important, so the control of infestation on hilltops is important for all districts.

The rate of spread of weed infestation and the resulting impact on carrying capacity is based on the experience of Monaro producers although there is a range of view regarding spread rates. Producer's view is that the spread of lovegrass has increased over the last 5 years which corresponds with better seasons and more summer rain, which is ideal for the spread of these weeds.

Love grass plants typically establish along road ways *and can be particularly hard to distinguish in summer in native country (there are at least two plants in this picture)*

Dollar impacts

The following assumptions and logic has been used to assess the ***financial impact*** of lovegrass spread across a property. The data used is based on producer's experiences based on 2017 discussions.

Land is categorised into three classes;

- **Clean native** country running 4 dse/ha
  (merino self-replacing)
- **Lovegrass/serrated tussock infested native country** running 2 dse/ha or 3dse/ha and only dry stock (wether only enterprise)
- **Sown country** running 8 dse/ha with the requirement for a flupropanate spray every 3 yrs. (merino self-replacing)

Two gross margins based on the NSW DPI template have been used for a merino self-replacing enterprise on the sown and native country with a wether only enterprise on the infested country;

Gross Margin 1

2017 - which has used the average prices and costs up until the end of October 17. This figure represents a substantial increase over the 5-year average of **$48/dse.**

Gross Margin 2

A 5-year average 2012 to 2016 of **$31/dse.**

<u>Economics used</u>

Pasture sowing costs = $250/ha.

Stock increase from 4 dse/ha to 8 dse/ha have been purchased at $150/ewe ($135/hd for the 2012-16 gross margin).

The combined cost of the pasture and extra stock has been financed by a term loan for 6 years at 6.5% interest.

<u>Weed control costs</u>

A cost of $45/ha has been used every 3 yrs for lovegrass control on the sown pasture.

Spot spraying has been costed on the infested country at a range of rates to reflect the local variation. Spraying occurs in the native and infested country to slow the rate of spread onto the clean country.

The starting point (year 0) of the analysis is that 15% of the property is infested with lovegrass. A number of management strategies are considered running forward from this point for ten years.

Options

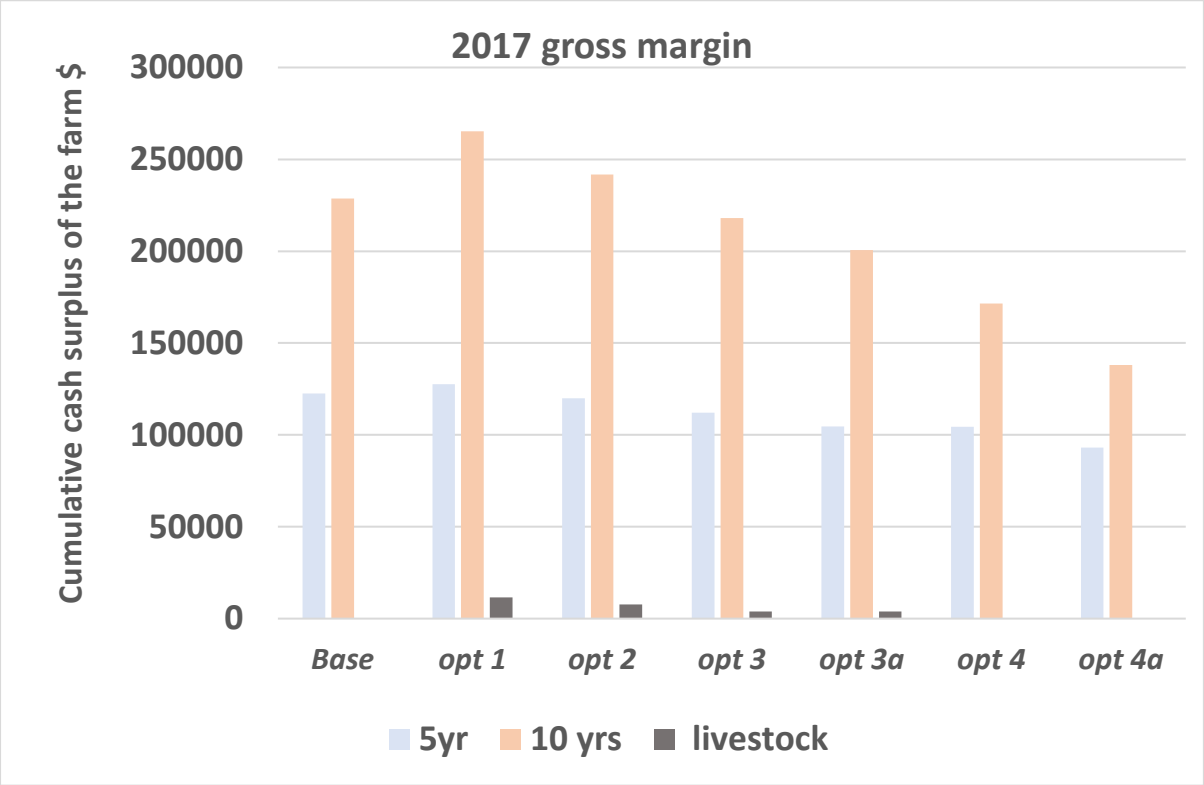
Base Option	Clean native country running 4 dse/ha ie no infestation
Option 1	The infestation is all on arable country and it is all sown down, the pasture costs occur in year 0 and the increase to 8 dse/ha occurs over 2 years.
Option2	Two thirds of the infestation is on arable country and sown and the remaining one third is on non-arable country which needs yearly spot spraying and has a lower carrying capacity of 3 dse/ha
Option 3	One third of the infestation is on arable land (sown) and two thirds on non-arable land (yearly spot spraying). Stocking rate on infested country = 3 dse/ha
Option 3a	One third of the infestation is on arable land and two thirds on non-arable land. Stocking rate = 2 dse/ha
Option 4	All the infestation is on non-arable land and over the next 10 years the level moves from 15% of the property to 25% of the property infested. Stocking rate on infested country = 3 dse/ha
Option 4a	All the infestation is on non-arable land and over the next 10 years the level moves from 15% of the property to 25% of the property infested. Stocking rate = 2 dse/ha **NB:** Due to the variation in producer views about the size of the negative impact on stocking rate, 2 rates have been examined. The amount of spot spraying is greater with the 3 dse/ha.

The dollar figures below are the cash positions of the business at 5 and 10 yrs assuming no debt at commencement. $120/ ha has been used to cover overhead costs and owner labour for the 2017 prices and $104/ha for the 5 year average prices.

In each 5-year period there is one “drought year” included with the associated feeding costs and negative impacts on production. The increase in livestock capital in the business from the increased stocking rate on the sown pasture has been included in figure 1&2 but no allowance for changes in land value have been included. The reality is that infested land will lose value compared to clean land.

Results

Figure 1 *shows the cash position (before tax and depreciation) on 250ha of native country at 5 and 10 years for the seven options using* ***Gross margin 1*** *values.*



A $0 figure indicates that all variable and overhead costs have been covered but there is no surplus cash. Negative values are financed by overdraft at 8.5%.

A term loan is used to pay the costs for pasture sowing plus the extra ewes. It is paid off by year 6 and all repayments and interest have been included.

The base case of the **uninfested native farm** is used to compare the impact of country becoming infested. As is consistent with previous work, the higher stocking rates that can be run on improved county results in higher profits/ha relative to the base case. So, the 15% of the property that was sown to control the lovegrass results in an improved cash position for the business especially at 10 years. There is little difference at 5 years due to the paying off of the term loan.

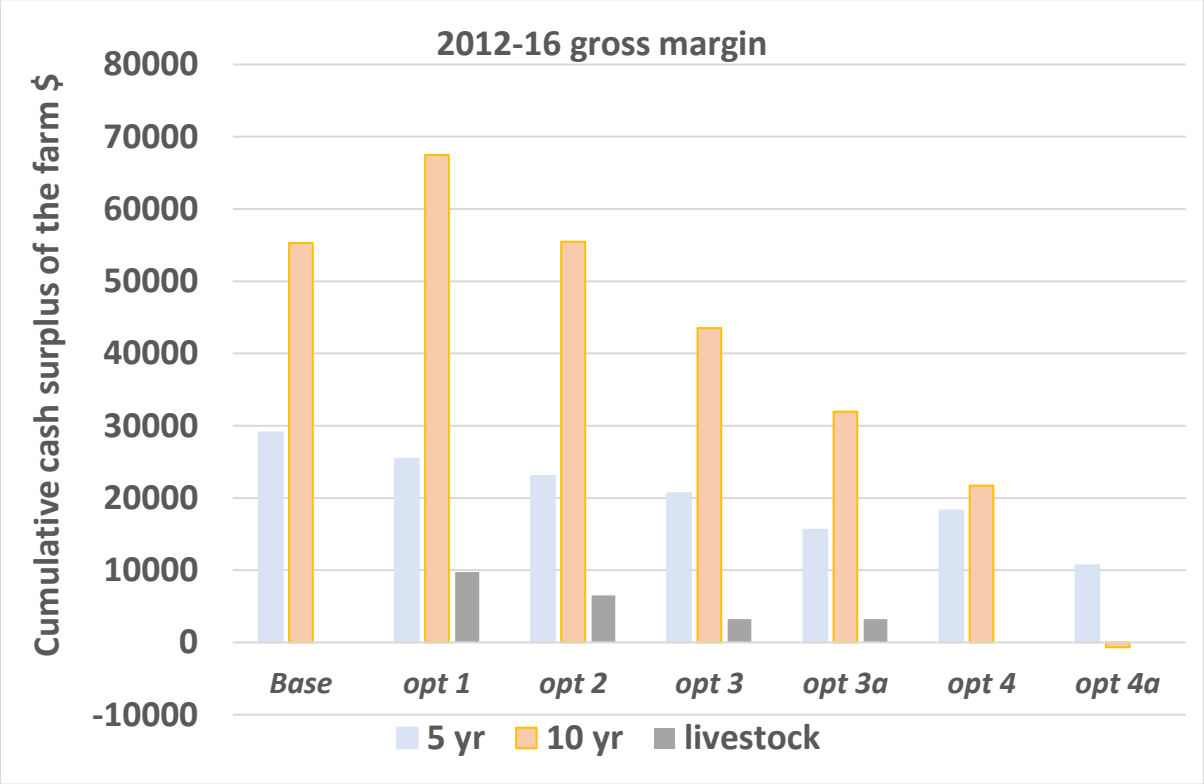
As the arability of the weed infested area decreases, the 10 years cash position become similar to the base native pasture with the break-even position being between option 2 and 3.

Having all the weed infestation on nonarable country, with the reduced ability to limit the spread, has the greatest negative impact on the 10-year cash position. The percentage reduction in cash is 25% and 40% for option 4 and 4a respectively. Going from 3 to 2 dse/ha has a big impact.

The lower productivity from the infested land result in losses due to the inability to cover the costs, especially the overhead costs.

The extra livestock capital in the business is small.

Figure 2 *shows the cash position (before tax and depreciation) on 250 ha of native country at 5 and 10 years using* ***gross margin 2*** *values.*



For the 2012-16 gross margin the cost of the extra ewes has been reduced to $130/hd.

Using this longer term gross margin, the cash position is under more pressure, but the trends are in the same direction as figure 1. Because these values are based on a 5-year average, they better reflect the cash position that Monaro properties would face given the level of weeds infestation examined. For option 4a the 10-year figure is worst due to the spread of the weeds and the inability of the lower stocking to generate enough money to cover overhead costs.

The sow option, under the 5-year average gross margin, is sensitive to the cost per hectare for pasture sowing. At $350/ha it takes 10 years to reach the break-even point compared to 5 years with a $250/ha cost.

The two gross margins highlight an important fact about agriculture. When profitability of the enterprise is high, producers must capture this extra profit into their business to provide a buffer to handle difficult market or seasonal conditions which will always occur in any 10-year period. Two years in ten might provide 60% of the profits. A reduced stocking rate due

to weeds lowers the ability to benefit from profitable periods placing long term pressure on the business.

Option 4a is not sustainable, the rate of loss will quicken every 5 years due to the interest on the overdraft.

Figure 3 and 4 shows the cumulative cash position for the 2 gross margins used over a 10 year period if the various options were applied to all the 250 ha, rather than just the 15% infested area. For all options the starting balance is zero.

Native represents the base case of clean country running a breeding operation at 4 dse/ha. **Sown** assumes the entire area is sown using the costs and timing of stocking already outlined. The need to repay the debt incurred for sowing and the extra stock means that the native and sown perform at similar levels until year 5, after which time the profitability of sown country improves markedly.

The importance of the stocking rate and hence income on the ability of the business to cover all costs, is shown by the **infested lines at 3 or 2 dse/ha**. The loss of carrying capacity has a major impact on the future financial health of the business. The loss of income is of greater importance than the increased costs. The 3 dse option has higher spraying costs then the 2 dse option.

Figure 3. The cash position for each of the land classes if it is applied to all 250ha using **gross margin 1**.

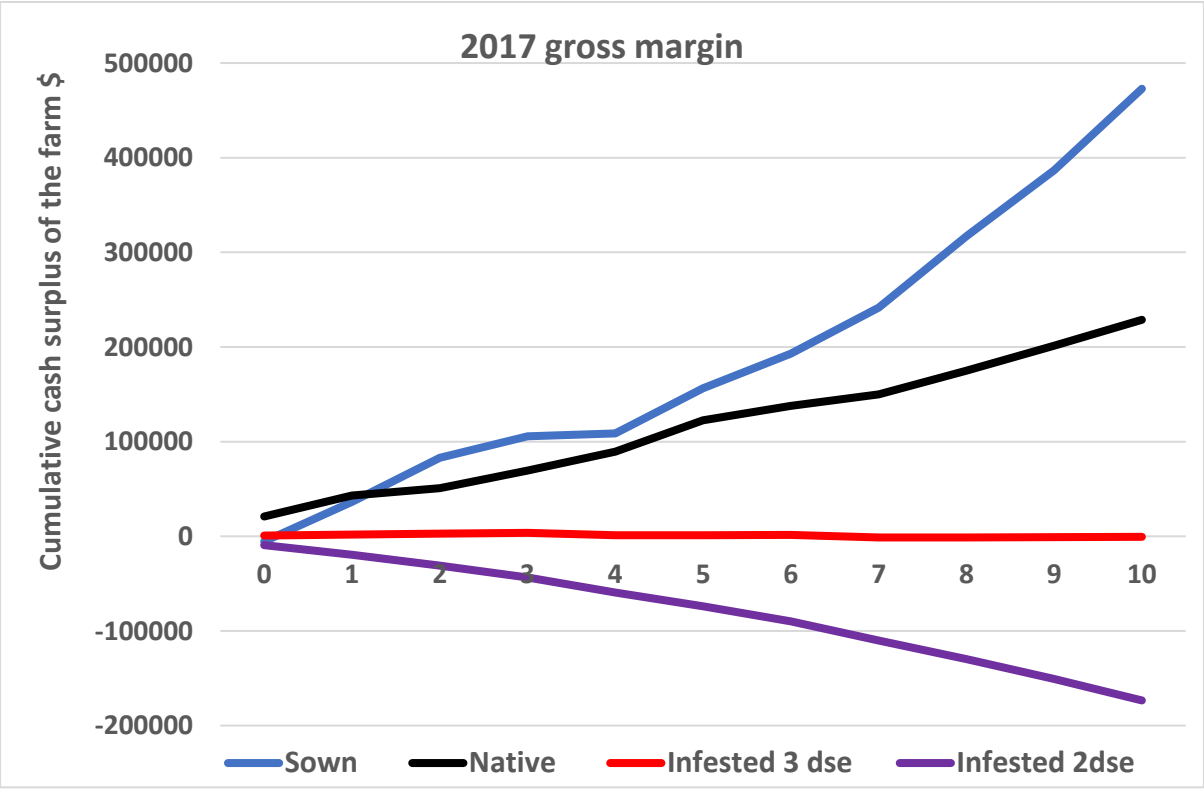
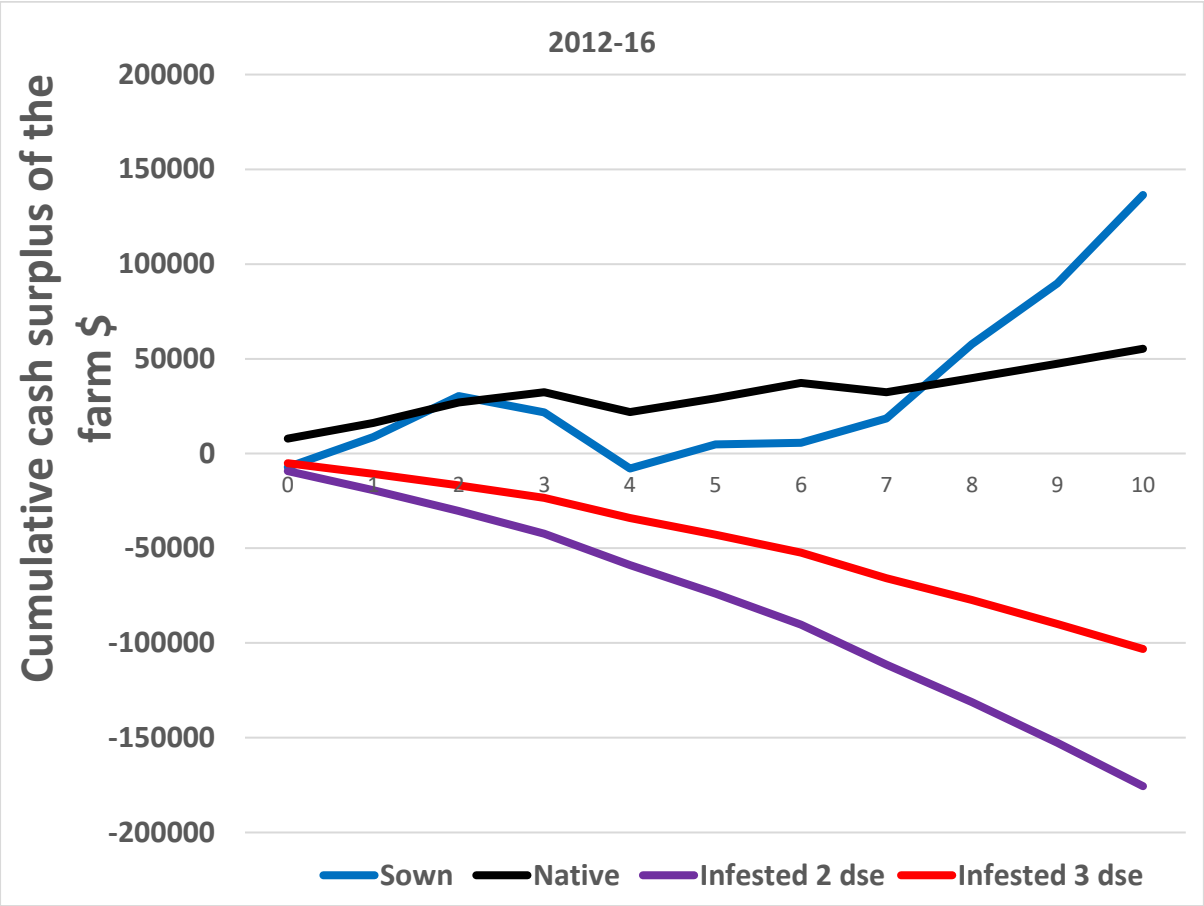


Figure 4. The cash position for each of the land classes if it is applied to all 250ha using **gross margin 2.**



The 2 dry years are 4 and 7 which are noticeable in the sown and native lines. The cost of feeding for the sown land is more than double the base figure due to the different stocking rate.

Serrated tussock infestations have different characteristics with more smaller plants so the potential impact on stocking rate might be less but the cost of spot spraying higher. The cost of spot spraying will vary depend a number of factor but the topography of the infested area is a major one.

Table 1. The **impact of different spot spraying rates**, (as quoted by Monaro producers) on the **cash position of native country** using **Gross Margin 1** (2017).

This is assuming only 20% of the 250ha is being sprayed but will involve checking the clean country for random outbreaks. Labour is the major component of the cost. The stocking rate was 4 dse/ha for all treatments.

	Cash position - 5 years	Cash position - 10 years
Base native no spraying	**$122,577**	**$228,710**
$40/ha spraying cost	**$109,673**	**$207,451**
$55/ha spraying cost	**$106,159**	**$199,693**
$70/ha spraying cost	**$96,384**	**$179,035**

Infestations in country with limited access increases spraying costs and at $70/ha has reduced the cash position by 22% across the time periods. Some producers have spot spraying costs higher than the values used.

Summary

The current very strong returns from livestock industries presents a good opportunity for producers to absorb the capital costs of a pasture improvement program aimed at reducing the area of infested land. This action has 2 benefits;

- Smaller area to be managed by spot spraying;
- Improves the financial robustness of the business to handle adverse events such as weeds and dry seasonal conditions.

It is the loss of production and its negative effects on the balance sheet of the business that is the major negative rather than the cost of spraying the weeds. In the long term it is the non-arable grasslands that are at the greatest risk. If these become infested the options to control and improve the situation are limited.

If regulation is enacted that puts limits on the sowing of pastures then the outcome on all properties would be best portrayed by the **non-arable option in this paper (options 4 and 4a). This would place a strong downward pressure on the profitability of livestock grazing on the Monaro.**

Producers regard the financial impact of serrated tussock to be less severe than lovegrass due to a lower reduction in stocking rate. If the serrated tussock infestation was so bad that the stocking rates used in this paper were realised then these values would apply.

Both perennial grass weeds require a consistent long-term program to manage their spread. A concerted 5-year program can have a positive impact but if yearly follow up is not continued then the gains made on the area infested will be lost. **Successful programs have been running for 20 years with work being done each year**. This aspect needs to be considered when looking at trial results. The results at 18 months after treatment might look very good but the data at 5 years post treatment is more important. This longer-term data is rarely reported.

If the prediction of increased summer rains from a changing climate are correct then this will enable the plants to spread at an increased rate putting more pressure on control programs. If this shift in rain coincides with an increasing rate of herbicide resistance then the area will be placed under stronger weed pressure.

Work to identify new alternative chemical control measures would be a sensible strategy to give producers options for the future to limit the negative impacts on agriculture and high conservation areas of the Monaro.

The rate at which the weeds can spread is an important factor in determining the size of the impact to the Monaro grasslands and agriculture. The faster the spread the greater the risk to high conservation areas and the larger the financial risk to grazing industries. All land owners must be part of the control program, especially absentee owners, if a positive outcome is too be achieved.

Links to other articles on control methods

- http://weeds.dpi.nsw.gov.au/Weeds/Details/3
- www.wool.com/globalassets/start/on-farm-research-and-development/production-systems-eco/pastures/weed-and-pest-management/3d_weed_guidelines_africanlovegrassjune2009_lowresfinal1.pdf
- www.nature.org.au/media-releases/2016/04/breakthrough-in-control-of-noxious-weed-african-lovegrass/
- http://www.uppersnowylandcare.org.au/wp-content/uploads/2014/09/Cooma-Council-Lovegrass-Facts.pdf
- http://freshscience.org.au/2010/1926
- http://www.graniteborderslandcare.com.au/admin/files/pages/1403566836_african_lovegrass_booklet.pdf
- http://weeds.dpi.nsw.gov.au/Weeds/Details/123
- http://www.serratedtussock.com.au/?i=168&chemical-control-of-serrated-tussock